Federal Ministry for Economic Cooperation and Development

Climate Risk Profile: Chad

Summary

This profile provides an **overview of projected climate parameters and related impacts** on different sectors in Chad until 2080 **under different climate change scenarios** (called Representative Concentration Pathways, RCPs). RCP2.6 represents the low emissions scenario in line with the Paris Agreement; RCP6.0 represents a medium to high emissions scenario. **Model projections do not account for effects of future socioeconomic impacts.**

Agro-ecological zones might **shift, affecting ecosystems, biodiversity** and **crop production**. Models project regionally varying changes in species richness and tree cover in response to climate change.

Agriculture, biodiversity, health, infrastructure and water are highly vulnerable to climate change. The **need for adaptation in these sectors should be represented in the German development cooperation portfolio** in Chad.

Per capita water availability will decline by 2080 mostly due to population growth. Model projections indicate that **water saving measures are expected to become particularly important after 2030**.

Depending on the scenario, **temperature** in Chad is projected to **rise by between 2.1 and 4.3 °C by 2080**, compared to pre-industrial levels, with higher temperature rises in northern Chad.

The **population affected by at least one heatwave per year** is projected to **rise** from 2.5 % in 2000 to 14 % in 2080. This is related to 49 more very hot days per year over this period. As a consequence, **heat-related mortality** is estimated to **increase by a factor of three** by 2080.

Precipitation trends are highly uncertain and project little change to an **annual precipitation increase of up to 50 mm by 2080**. Future dry and wet periods are likely to become **more extreme**.

Climate change is likely to cause **severe damage to the infrastructure** sector in Chad. Especially transport infrastructure is vulnerable to extreme weather events, yet essential for trading agricultural goods. Investments will need to be made into climate-resilient roads and other infrastructure.

The models project a possibility of an **increase in crop land exposure to drought**. Yields of heat- and drought-sensitive crops such as maize are projected to decline, while yields of rice are projected to benefit from CO_2 fertilisation. Farmers will need to adapt to these changing conditions.

Context

Chad is a **landlocked country** in northern central Africa, **belonging to the Sahel region**. The population is expected to exceed **16 million in 2020**, given the current annual **population growth rate of 3 %** [1]. The majority of the inhabitants live in the central and south-western part around Lake Chad, while the north remains less populated, mainly due to a hotter and drier desert climate [2]. With a real GDP per capita of 814 USD, Chad is one of the poorest countries in the world, **counting as a least developed country (LDC)** [1]. Its economy is dominated by the agricultural sector, contributing 44.9 % to the country's GDP in 2018, followed by the services sector with 37.7 % and the industrial sector with 14.3 % [3]. Chad's main export is petroleum with 92 % of total exports, followed by insect resins (2.7 %) and oilseeds (2.3 %), the latter being Chad's most important cash crop [4]. Overall, **80 % of the population is engaged in smallholder farming and heavily relies on agriculture for food security and livelihoods** [2]. Therefore, concerns are rising about the effects of climate change including rising temperatures, reduced water availability and the occurrence of floods and other extreme weather events.

Agricultural production in Chad is primarily subsistence-based and rainfed. The **main staple crops are millet, sorghum, groundnuts, maize, dry beans and rice** [5]. In 2002, less than 8 % of the estimated irrigation potential of 335 000 ha (0.7 % of total national crop land) was irrigated [6]. Especially smallholder farmers suffer from the impacts of climate variability, which can reduce their food supply and increase the risk of hunger and poverty. **Limited adaptive capacity in the agricultural sector underlines the country's vulnerability to climate change**.

Chad currently serves as **a destination for approximately 512 000 migrants and refugees**, 70 % of whom are from Sudan [7]. Other major countries of origin include the Central African Republic (19 %) and Cameroon (7 %) [7]. Since its independence from France in 1960, Chad has seen a series of civil wars, the most recent one from 2005 to 2010, as well as frequent intercommunal conflicts and forced displacement [8], which is why many Chadians migrate to neighbouring countries, mainly to Sudan and Cameroon [7].

Quality of life indicators [1], [9]–[11]

Human Development Index (HDI) 2018	ND-GAIN Vulnerability Index 2018	GINI Coefficient 2011	Real GDP per capita 2019	Poverty headcount ratio 2011	Prevalence of undernourishment 2016–2018
0.401 **187 out of 189** (0 = low, 1 = high)	**27.2** **180 out of 181** (0 = low, 100 = high)	**43.3** (0–100; 100 = perfect inequality)	**814 USD** (constant 2010 USD)	**38.4 %** (at 1.9 USD per day, 2011 PPP) [1]	**37.5 %** (of total population)

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[1] Poverty headcount ratio for the year 2016 adjusted to 2011 levels of Purchasing Power Parity (PPP). PPP is used to compare different currencies by taking into account national differences in cost of living and inflation.

Topography and environment

Chad's landscape is **mostly flat with an average altitude of 550 m**. Only in the north and east, altitudes rise further, reaching 3 415 m at **Mount Emi Koussi**, which is a volcano and also the highest peak in the Sahara [12]. The country has two principal types of climate: The north and centre are characterised by desert, while the south has a more tropical climate (Figure 1). On average, Chad receives between **10 and 1 000 mm of precipitation per year between May and October** with a mean annual temperature of around 28 °C [13]. In terms of surface water, Chad's major source is **Lake Chad**, which is located on the western border and which supports around 50 million people in the entire basin including neighbouring Cameroon, Niger and Nigeria [14]. Lake Chad used to rank as one of the largest lakes in Africa, yet due to **climate impacts and unsustainable water management**, the lake surface has shrunk from approximately 25 000 km² in the 1960s to a minimum of 1 800 km² in 2010, before starting to slowly increase again in the following years [14]. Chad is served by **two major rivers**: The **Chari and Logone**, both of which originate in the Central African Republic, with the Chari feeding into Lake Chad. The country can be divided into **seven agro-ecological zones (AEZ)**: Desert, Arid/Sahel, Semi-arid/Sudan Savannah, Northern Guinea Savannah, Southern Guinea Savannah, Derived Savannah and High Altitude [15].[2] Each of these zones is characterised by specific temperature and moisture regimes and, consequently, specific patterns of crop production and pastoral activities. Unsustainable agricultural practices, such as overgrazing or slash-and-burn agriculture, have resulted in major environmental issues including deforestation, land degradation and poaching [16]. Heavier precipitation and drier conditions are expected to intensify in the context of climate change, highlighting the **need for adaptation strategies in order to protect biodiversity and maintain fragile ecosystems and their services**.

Present climate [13]

The climate of Chad is generally hot and dry. The northern part of the country is characterised by desert with annual mean temperatures of up to 29 °C and high rates of evapotranspiration. Precipitation is decreasing towards the north, reaching annual precipitation sums as low as 10 mm.

In the southern part of Chad, the climate is more tropical: Annual mean temperature is around 27 °C with annual precipitation sums of around 1 000 mm, which makes this region more suitable for crop production.

Chad has a single rainy season (unimodal precipitation regime), receiving most of its annual precipitation between May and October.

Figure 1: Topographical map of Chad with agro-ecological zones and existing precipitation regimes.[3]

[2] It should be noted that there are different classifications of AEZs in Chad.

[3] The climate diagrams display temperature and precipitation values which are averaged over an area of approximately 50 km × 50 km. Especially in areas with larger differences in elevation, the climate within this grid might vary.

Projected climate changes

How to read the line plots

historical — best estimate
RCP2.6 — likely range
RCP6.0 — very likely range

Lines and shaded areas show multi-model percentiles of 31-year running mean values under RCP2.6 (blue) and RCP6.0 (red). In particular, lines represent the best estimate (multi-model median) and shaded areas the likely range (central 66 %) and the very likely range (central 90 %) of all model projections.

How to read the map plots

Colours show multi-model medians of 31-year mean values under RCP2.6 (top row) and RCP6.0 (bottom row) for different 31-year periods (central year indicated above each column). Colours in the leftmost column show these values for a baseline period (colour bar on the left). Colours in the other columns show differences relative to this baseline period (colour bar on the right). The presence (absence) of a dot in the other columns indicates that at least (less than) 75 % of all models agree on the sign of the difference. For further guidance and background information about the figures and analyses presented in this profile kindly refer to the supplemental information on how to read the climate risk profile.

Temperature

In response to increasing greenhouse gas (GHG) concentrations, **air temperature over Chad is projected to rise by 2.1 to 4.3 °C (very likely range) by 2080** relative to the year 1876, depending on the future GHG emissions scenario (Figure 2). Compared to pre-industrial levels, median climate model temperature increases over Chad amount to approximately 2.1 °C in 2030 and 2.5 °C in both 2050 and 2080 under the low emissions scenario RCP2.6. Under the medium/high emissions scenario RCP6.0, median climate model temperature increases amount to 2.1 °C in 2030, 2.6 °C in 2050 and 3.5 °C in 2080.

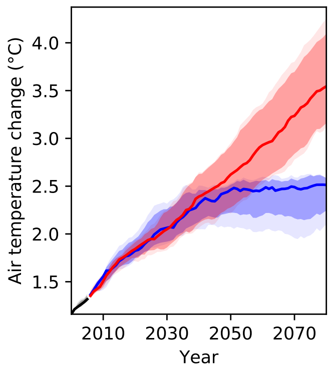

Figure 2: Air temperature projections for Chad for different GHG emissions scenarios.[4]

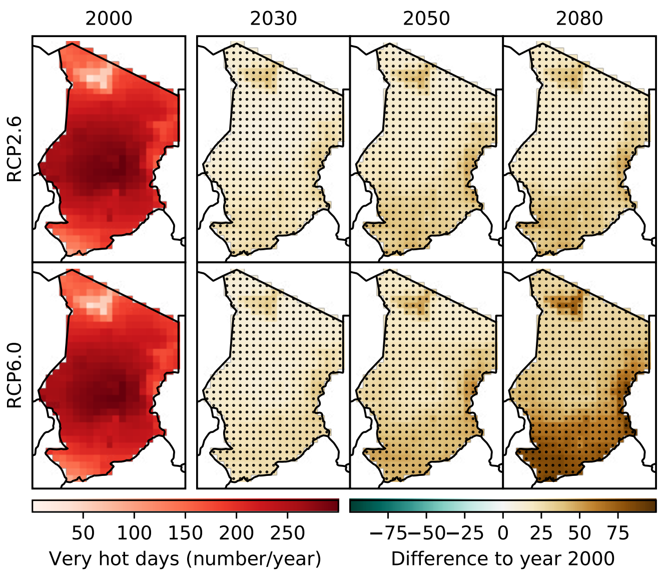

Figure 3: Projections of the annual number of very hot days (daily maximum temperature above 35 °C) for Chad for different GHG emissions scenarios.

Very hot days

In line with rising mean annual temperatures, the annual number of very hot days (days with daily **maximum temperature above 35 °C**) is projected to rise with high certainty all over Chad (Figure 3). Under the medium/high emissions scenario RCP6.0, the multi-model median, averaged over the whole country, projects **17 more very hot days per year in 2030 than in 2000**, **31 more in 2050** and **49 more in 2080**. In some parts, especially in central Chad, this amounts to more than 300 days per year by 2080.

[4] Changes are expressed relative to year 1876 temperature levels using the multi-model median temperature change from 1876 to 2000 as a proxy for the observed historical warming over that time period.

Precipitation

Future projections of precipitation are less certain than projections of temperature change due to high natural year-to-year variability (Figure 4). Out of the four climate models underlying this analysis, one model projects a decreasing trend in mean annual precipitation over Chad, one projects no change and two models project strong increases under RCP6.0. Compared to year 2000, median model projections show an **increase in mean annual precipitation** by 32 mm under RCP2.6 and 50 mm under RCP6.0 until 2080.

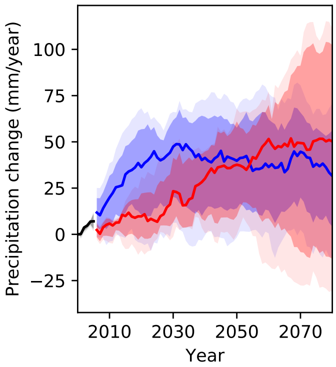

Figure 4: Annual mean precipitation projections for Chad for different GHG emissions scenarios, relative to the year 2000.

Heavy precipitation events

In response to global warming, **heavy precipitation events are expected to become more intense** in many parts of the world due to the increased water vapour holding capacity of a warmer atmosphere. At the same time, the number of days with heavy precipitation events is expected to increase. This tendency is also found in climate projections for Chad (Figure 5), with climate models projecting **an increase in the number of days with heavy precipitation**, from 7 days per year in 2000 to 9 and 10 days per year in 2080 under RCP2.6 and RCP6.0, respectively.

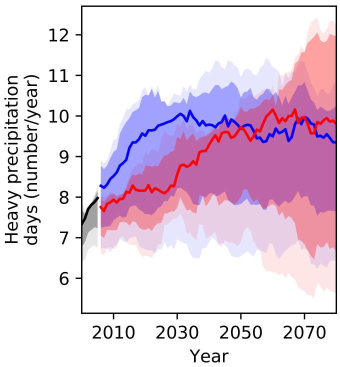

Figure 5: Projections of the number of days with heavy precipitation over Chad for different GHG emissions scenarios, relative to the year 2000.

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Soil moisture

Soil moisture is an important indicator for drought conditions. In addition to soil parameters and management, it depends on both precipitation and evapotranspiration and therefore also on temperature, as higher temperatures translate to higher potential evapotranspiration. **Annual mean top 1-m soil moisture projections for Chad show almost no change under either RCP by 2080** compared to the year 2000 (Figure 6). However, there is considerable modelling uncertainty, as different hydrological models project different directions of change, which makes it difficult to identify a clear trend.

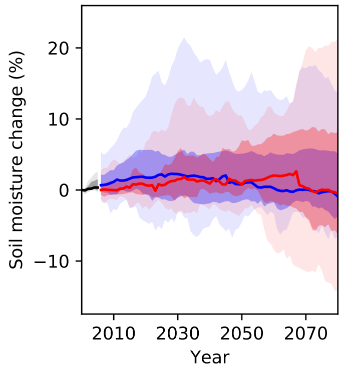

Figure 6: Soil moisture projections for Chad for different GHG emissions scenarios, relative to the year 2000.

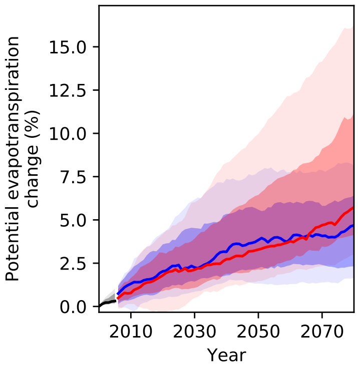

Figure 7: Potential evapotranspiration projections for Chad for different GHG emissions scenarios, relative to the year 2000.

Potential evapotranspiration

Potential evapotranspiration is the amount of water that would be evaporated and transpired if sufficient water was available at and below the land surface. Since warmer air can hold more water vapour, **it is expected that global warming will increase potential evapotranspiration in most regions of the world.** In line with this expectation, hydrological projections for Chad indicate a stronger rise of potential evapotranspiration under RCP6.0 than under RCP2.6 (Figure 7). Under RCP6.0, **potential evapotranspiration is projected to increase by 2.1 % in 2030, 3.3 % in 2050 and 5.7 % in 2080** compared to year 2000 levels.

Sector-specific climate change risk assessment

a. Water resources

Current projections of water availability in Chad display high uncertainty under both GHG emissions scenarios. Assuming a constant population level, multi-model median projections suggest almost no change in per capita water availability over Chad by the end of the century under either RCPs (Figure 8A). Yet, when accounting for population growth according to SSP2 projections[5], **per capita water availability for Chad is projected to decline by 75 % by 2080** relative to the year 2000 under both scenarios (Figure 8B). While this decline is primarily driven by population growth rather than climate change, it highlights the urgency to invest in water saving measures and technologies for future water consumption.

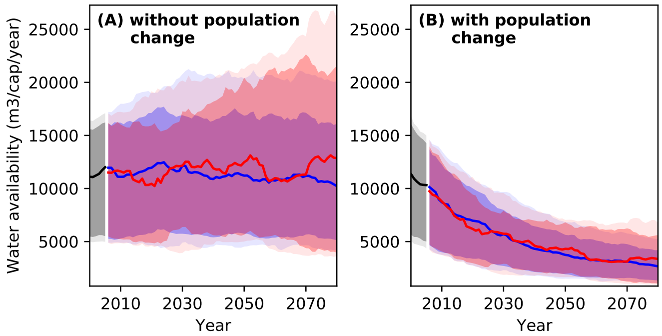

Figure 8: Projections of water availability from precipitation per capita and year with (A) national population held constant at year 2000 level and (B) changing population in line with SSP2 projections for different GHG emissions scenarios, relative to the year 2000.

Projections of future water availability from precipitation vary depending on the region (Figure 9). In line with precipitation projections, **water availability is projected to increase in central and particularly in northern Chad** under both RCPs. However, especially towards the end of the century, model agreement on these increases is low. The projected increase in water availability is based on a constant population level. Hence, **water saving measures are likely to remain important for the country's rapidly growing population**.

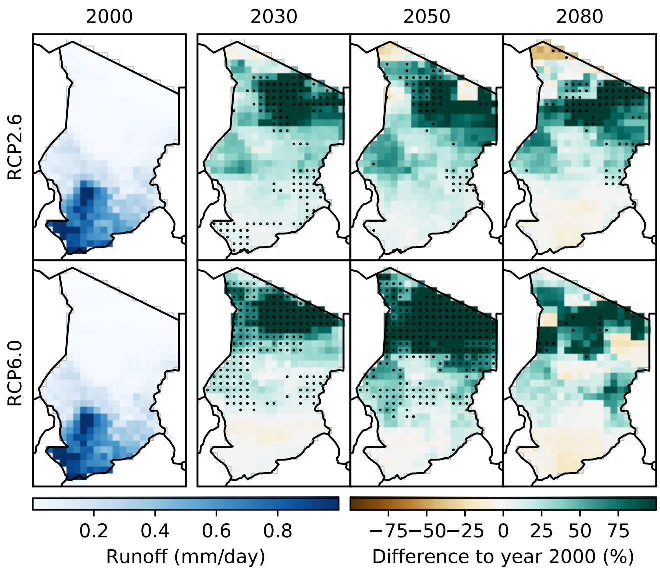

Figure 9: Water availability from precipitation (runoff) projections for Chad for different GHG emissions scenarios.

Over the last decades, Chad has experienced strong seasonal and annual variations in precipitation, which present a major constraint to agricultural production [17], [18]. The country was hit by **severe droughts between 1950 and the mid-1980s** as precipitation decreased during that time [19]. Annual precipitation sums recovered afterwards but remain below the 20th century average [19]. Further droughts were registered in 2005, 2008, 2010 and 2012 [20]. The 2012 Sahel drought **affected a total of 3.6 million people** in Chad [21]. Transhumance used to be an effective way to deal with variations in precipitation and droughts, with many Chadian pastoralists migrating to the Central African Republic during the dry season [22]. However, people's reliance on this type of pastoralism has been challenged by increasingly unpredictable precipitation patterns and a 150-km southward spread of the Sahara and Sahel zones over the period between 2005 and 2015 [23]. The resulting **lack of pastures and water** has led to **increasing competition over these scarce resources** [23]. Other stressors include **population growth, conflicts between farmers and herders** and **terrorist activities** in the greater region, making this mode of living less profitable and sometimes even dangerous [24], [25]. Repeated droughts tend to have a cascading effect: Lack of water reduces crop yields, which increases the risk of food insecurity for people and their livestock, which in turn limits their capacity to cope with future droughts [26].

[5] Shared Socio-economic Pathways (SSPs) outline a narrative of potential global futures, including estimations of broad characteristics such as country-level population, GDP or rate of urbanisation. Five different SSPs outline future realities according to a combination of high and low future socio-economic challenges for mitigation and adaptation. SSP2 represents the "middle of the road"-pathway.

b. Agriculture

Smallholder farmers in Chad are increasingly challenged by the uncertainty and variability of weather that climate change causes [17], [18]. Since **crops are predominantly rainfed**, they depend on water availability from precipitation. However, the length and intensity of the rainy season is becoming increasingly unpredictable and the **use of irrigation facilities remains limited** due to high costs of initial investment, inefficient use of water resources and a lack of water storage and delivery techniques [27]. In 2002, less than 8 % of the estimated irrigation potential of 335 000 ha (0.7 % of the total national crop land) was irrigated [6]. Especially in central and northern Chad, **soils are poor in nutrients, sandy and shallow**, which has a negative effect on water retention, making soils vulnerable to drying and erosion [28].

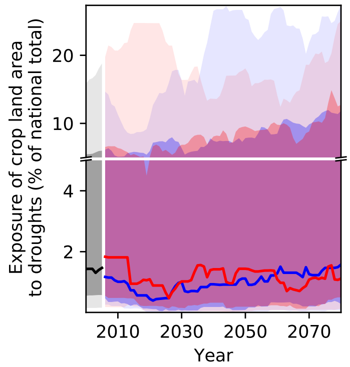

Figure 10: Projections of crop land area exposed to drought at least once a year for Chad for different GHG emissions scenarios.

Currently, the high uncertainty of projections regarding water availability (Figure 9) translates into high uncertainty of drought projections (Figure 10). According to the median over all models employed for this analysis, **the national crop land area exposed to at least one drought per year will hardly change in response to global warming.** However, there are **models that project a strong increase in drought exposure.** Under RCP6.0, the likely range of drought exposure of the national crop land area per year widens from 0.6–5.5 % in 2000 to 0.5–12.7 % in 2080. The very likely range widens from 0.1–15.8 % in 2000 to 0.1–25.0 % in 2080. This means that **some models project up to a twofold increase in drought exposure over this time period, while others project no change.**

Climate change will have a negative impact on yields of maize, millet and sorghum (Figure 11)[6]. While maize is sensitive to hot temperatures above 35 °C, millet and sorghum have higher tolerance for hot temperatures and dry periods [29]. Still, model results indicate a **negative yield trend for all three crops** under both RCPs with a stronger decrease under RCP6.0. Compared to the year 2000, amounts are projected to decline by 7.4 % for maize and 9.6 % for millet and sorghum by 2080 under RCP6.0. Under RCP2.6, yields of maize are projected to decline by 2.9 % and yields of millet and sorghum by 6.5 %. **Yields of rice, on the contrary, are projected to gain from climate change**. Under RCP6.0, projections show an increase by 3.8 % by 2080 relative to the year 2000. These positive results under RCP6.0 can be mainly explained by the CO_2 fertilisation effect, which benefits plant growth. Rice is a so-called C3 plant, which follows a different metabolic pathway than maize, millet and sorghum (C4 plants), and benefits more from higher concentration pathways. **Yields of groundnuts are projected to decrease under RCP2.6 and increase under RCP6.0**. The decrease under RCP2.6 can be explained by non-temperature related parameters such as changes in precipitation, while the increase under RCP6.0 can be explained by the CO_2 fertilisation effect.

Overall, adaptation strategies such as switching to improved varieties in climate change sensitive crops should be considered, yet carefully weighed against adverse outcomes, such as a resulting decline of agro-biodiversity and loss of local crop types.

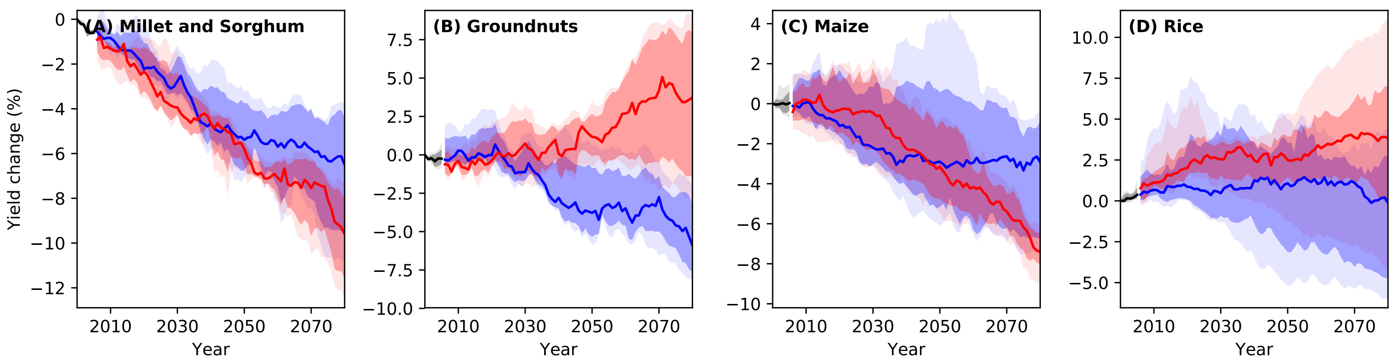

Figure 11: Projections of crop yield changes for major staple crops in Chad for different GHG emissions scenarios assuming constant land use and agricultural management.

[6] Modelling data is available for a selected number of crops only. Hence, the crops listed on page 2 may differ. Maize, millet and sorghum are modelled for all countries, except for Madagascar.

c. Infrastructure

Climate change is expected to significantly affect Chad's infrastructure sector through extreme weather events, such as flooding and heatwaves. High precipitation amounts can lead to **flooding of roads**, while high temperatures can cause **roads, bridges and protective structures to develop cracks and degrade more quickly**. The absence of railways, seasonal navigability of rivers and limited airport facilities increase Chad's reliance on road transportation [30]. The country's road density ranges from 40.5 km per 1 000 km² in the south to only 6.4 km per 1 000 km² in the north, making it one of the lowest on the continent [30]. Many unpaved roads become impassable during the rainy season, cutting off villages and rural communities [30]. Investments will have to be made to build climate-resilient road networks.

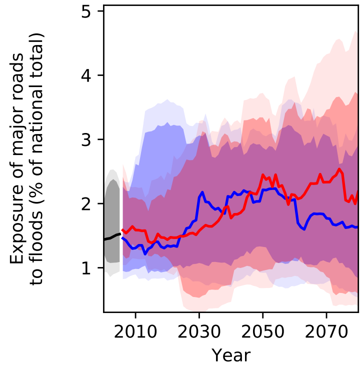

Figure 12: Projections of major roads exposed to river floods at least once a year for Chad for different GHG emissions scenarios.

Extreme weather events will also have **devastating effects on human settlements and economic production sites**, especially in urban areas with high population densities like N'Djamena, Moundou or Sarh. **Informal settlements are particularly vulnerable to extreme weather events**: Makeshift homes are often built in unstable geographical locations including river banks, where flooding can lead to loss of housing, contamination of water, injury or death. Dwellers usually have low adaptive capacity to respond to such events due to high levels of poverty and a lack of risk-reducing infrastructures. In 2012, **heavy floods in southern Chad affected up to 700 000 people** [31], with the most affected regions being Tandjilé, Mayo-Kebbi Est, Mayo-Kebbi Ouest and Sila [32]. At least 255 000 hectares of cropland and 96 000 houses were destroyed [32].

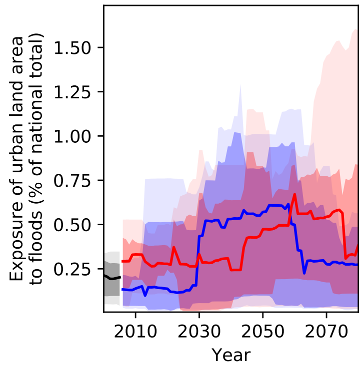

Figure 13: Projections of urban land area exposed to river floods at least once a year for Chad for different GHG emissions scenarios.

Despite the risk of infrastructure damage being likely to increase, precise predictions of the location and the extent of exposure are difficult to make. For example, projections of river flood events are subject to substantial modelling uncertainty, largely due to the uncertainty of future projections of precipitation amounts and their spatial distribution, affecting flood occurrence (see also Figure 4). In the case of Chad, projections show an **increase in the exposure of major roads to river floods** from 1.4 % in 2000 to 2.2 % by 2080 under RCP6.0. Under RCP2.6, projections indicate an increase towards mid-century but no overall change by 2080 (Figure 12). **Exposure of urban land area to floods is projected to not change under RCP2.6 and to increase slightly under RCP6.0,** from 0.2 % in 2000 to 0.4 % in 2080 (Figure 13).

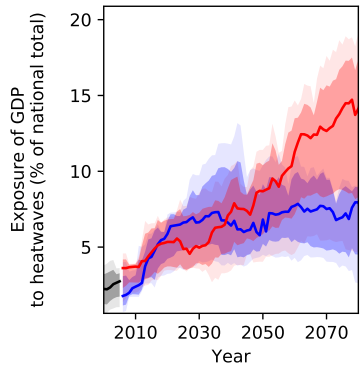

Figure 14: Exposure of GDP in Chad to heatwaves for different GHG emissions scenarios.

While three out of four models project **an increase in the exposure of the GDP to heatwaves**, its magnitude is uncertain, with one model projecting strong and two models projecting more moderate increases. Median model projections for RCP2.6 show an increase from 2.2 % in 2000 to 8.0 % by 2080. Under RCP6.0, exposure is projected to rise to 14 % over the same period (Figure 14).

It is recommended that policy planners start identifying heat-sensitive economic production sites and activities, and integrating climate adaptation strategies, such as improved, solar-powered cooling systems, "cool roof" isolation materials or switching the operating hours from day to night [33].

d. Ecosystems

Climate change is expected to have a significant influence on the ecology and distribution of tropical ecosystems, though the magnitude, rate and direction of these changes are uncertain [34]. With rising temperatures and increased frequency and intensity of droughts, **wetlands and riverine systems are increasingly at risk of being converted to other ecosystems** with plants being succeeded and animals losing habitats. Increased temperatures and droughts can also influence succession in forest systems while concurrently increasing the risk of invasive species, all of which affect ecosystems.

Model projections of species richness (including amphibians, birds and mammals) and tree cover for Chad are shown in Figure 15 and 16, respectively. The models applied for this analysis show similar patterns of change in species richness across both RCPs, with higher modelling uncertainty under RCP2.6. Under RCP6.0, models project **increases in the number of species of up to 40 % for north-eastern Chad and decreases of up to 20 % for the western and southern parts** of the country by 2080.

With regards to tree cover, model projections vary depending on the scenario (Figure 16). Under RCP2.6, models project a decrease in tree cover of 2 % for the very south of Chad, while under RCP6.0, tree cover is projected to increase by 2 % in the south of the country by 2080[7].

Although these results paint a rather positive picture for climate change impacts on tree cover, it is important to keep in mind that the **model projections exclude any impacts on biodiversity loss from human activities such as land use**, which have been responsible for significant losses of global biodiversity in the past, and are expected to remain its main driver in the future [35]. For example, population influxes in affected areas, need for pasture and agricultural land and logging have resulted in high rates of deforestation [36]: Chad has lost 1.54 million ha of forest cover in the period from 2001 to 2016, which is equivalent to a 25 % decrease [37].

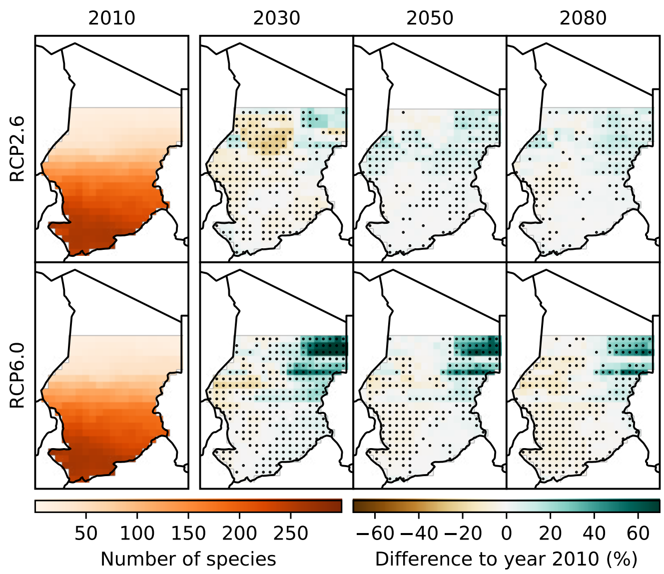

Figure 15: Projections of the aggregate number of amphibian, bird and mammal species for Chad for different GHG emissions scenarios.

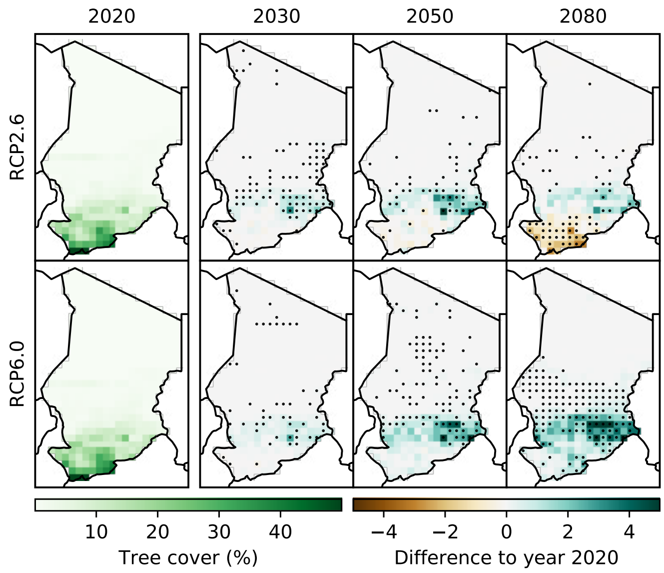

Figure 16: Tree cover projections for Chad for different GHG emissions scenarios.

[7] Due to the low starting values of tree cover in most parts of Chad, even small actual changes can lead to high percentage changes, which is why tree cover projections should be considered with caution.

e. Human health

Climate change threatens the health and sanitation sector through more frequent incidences of heatwaves, floods, droughts and storms. Among the key health challenges in Chad are morbidity and mortality through vector-borne diseases such as malaria, waterborne diseases related to extreme weather events (e.g. flooding) such as diarrhoea and cholera, respiratory diseases, measles and meningitis [38], [39]. **Climate change can impact food and water supply, which can increase the risk of malnutrition and hunger**. Many of these challenges are expected to become more severe under climate change. According to the World Health Organization (WHO), more than 2.5 million cases of malaria including 8 693 deaths were reported in 2018 [38]. **Climate change is likely to have an impact on malaria transmission periods and the geographic range of vector-borne diseases:** In Chad, like in other Sahel countries, the general malaria risk could decrease due to rising temperatures, but some regions are likely to become more vulnerable, for instance, due to more frequent incidences of flooding [39], [40]. **Temperature increases and humidity decreases due to climate change have the potential to significantly increase the number of meningitis cases** and prepone the seasonal onset of meningitis [41], [42]. Southern Chad is part of the so-called Meningitis Belt, which largely coincides with the Sahel region and which is where the majority of meningitis epidemics occur. **Food insecurity and malnutrition present another major health problem:** Between June and August 2020, 1.1 million people are expected to be severely food insecure with more than 460 000 cases of severe acute malnutrition [43].

Rising temperatures will result in **more frequent heatwaves** in Chad, leading to **increased heat-related mortality.** Under RCP6.0, the population affected by at least one heatwave per year is projected to increase from 2.5 % in 2000 to 14 % in 2080 (Figure 17).

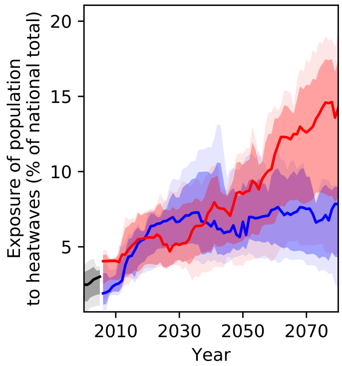

Figure 17: Projections of population exposure to heatwaves at least once a year for Chad for different GHG emissions scenarios.

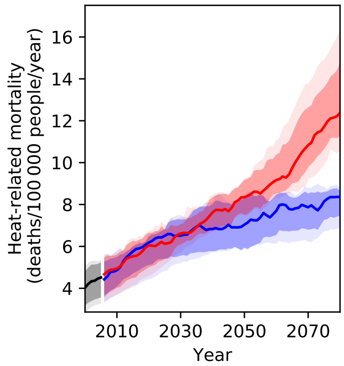

Figure 18: Projections of heat-related mortality for Chad for different GHG emissions scenarios assuming no adaptation to increased heat.

Furthermore, under RCP6.0, **heat-related mortality will likely increase from approximately 4 to about 12 deaths per 100 000 people per year** (Figure 18). This translates to an increase by a factor of more than three towards the end of the century compared to year 2000 levels, provided that no adaptation to hotter conditions will take place. Under RCP2.6, heat-related mortality is projected to increase to about 8 deaths per 100 000 people per year in 2080.

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